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Photochemical assessment of maize (*Zea mays* L.) seedlings grown under water stress using photophenomics technique

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Abstract

Abiotic stress adversely affects crop growth worldwide. Drought of the major abiotic stresses have the most significant impact on all of the crop. The main objective of this study was to assess the effects of drought stress on photochemical performance and vitality of maize (*Zea mays* L.). The photochemical characteristics were analyzed in the context of period of drought stress during the maize growth. Drought experiment was carried out for four weeks, thereafter, the drought treated maize was re-watered. The polyphasic OJIP fluorescence transient was used to evaluate the behavior of photosystem II (PSII) and photosystem I (PSI) during the entire experiment period. In drought stress, the performance Index (PI) level was reached earlier when compared to the controls. For the screening of drought stress tolerance the drought factor index (DFI) of each variety was calculated as follow $DFI = \log(A) + 2\log(B)$. All the fourteen cultivars show DFI ranged from -0.69 to 0.30, meaning less useful in selection of drought tolerant cultivars. PI and electron transport flux values of fourteen cultivars were to indicate reduction of photosynthetic performance during the early vegetative stage under drought stress. In conclusion, DFI and energy flux parameters can be used as photochemical and physiological index.

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Keywords: Maize, Photophenomics, Drought Stress, DFI

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